Better Environmental Solutions News

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Midwest Biomass Flood Reduction Buffer Plan

Goal

To create a voluntary program that gives farmers the opportunity to produce biomass crops in Midwest floodplains, floodways, and other environmentally sensitive lands including other riparian areas to reduce downstream flooding, crop loss, water pollution, grow biomass for energy production, and to store and reduce CO2.

Summary

Flooding in Iowa, Wisconsin and the Midwest has inundated lowlands and floodplains many times over the last 15 years. Many farmers are struggling with repeated crop losses from that flooding.

The Midwest Biomass Flood Reduction Buffer Plan offers farmers an opportunity to grow perennial biomass cover crops such as switchgrass, prairie and other grasses, and dedicated woody crops in floodplains and floodways, reap the harvest of those perennial energy crops, and reduce risk of crop loss to flooding.

These crops could be harvested and burned in power and heating plants. Alliant Energy has committed to burning 10% biomass at their Marshalltown, Iowa power plant and exploring biomass usage at Ottumwa and other power and ethanol plants. Ecel Energy is also burning biomass at their La Crosse, WI plant.

The farmer would maintain land ownership and receive cost assistance to establish the biomass crop from the 2008 Farm Bill Biomass Crop Assistance Program (BCAP), other USDA programs, and federal and state hazard mitigation funds. The utilities would give the farmers long term contracts for the biomass. The farmer could also get payments for carbon sequestration from the Farm Bureau, Farmers Union, or other carbon aggregators.

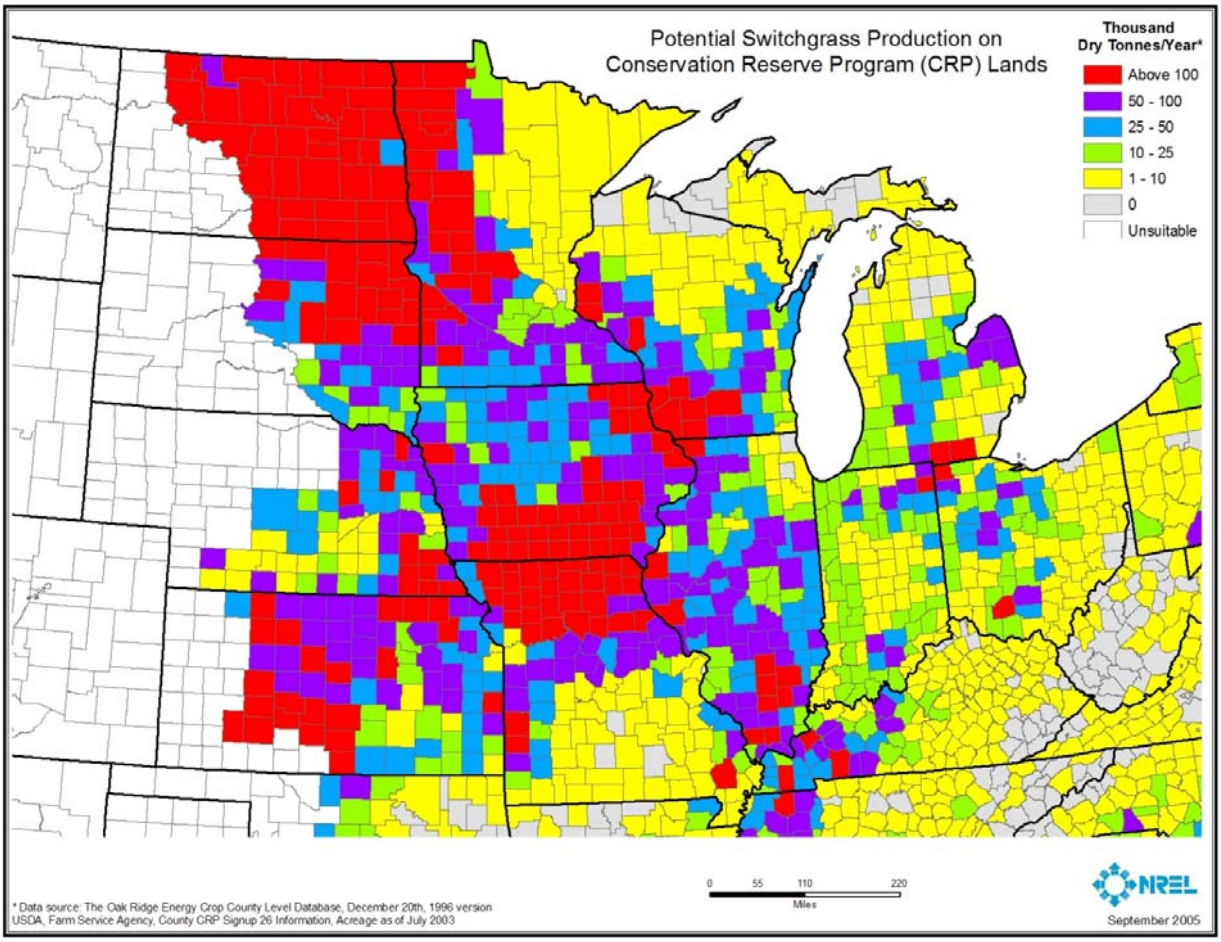
This is a better environmental solution for farmers and energy companies.

Background

Floods have devastated many parts of the Midwest this year and in 2001 and 1993. The 1993 flood was the worst flood disaster in American history killing more than 50 and costing more than $16 billion, with $12 billion in agricultural losses alone.

Flooding is made worse by the loss of habitat. Much of Iowa, Wisconsin, and the Midwest were originally covered with tallgrass prairies made up of switchgrass, Big Bluestem, Indiangrass and many other grasses and flowers.

The 2005 US Department of Energy study estimates the Midwest has 11.3 million ton s of potential switchgrass and other grasses from Conservation Reserve Program (CRP) lands, mostly in southern and northeastern parts of the state.[1] See the map below. But this flood reduction program looks at adding additional grasslands near waterways, not just CRP lands.



Restoring switchgrass and native prairie has many advantages:

- **Reduce Flooding--**USDA Natural Resources Conservation Service studies in Minnesota and Iowa on the Boone and Redwood Rivers showed that prairie restoration and farm conservation practices can reduce 100-year flood peaks by up to 20%, and by almost 40% with other measures such as the restoring wetlands and small flood detention projects. One NRCS study on Whitebreast Creek in northwestern Iowa showed that CRP in prairies grasslands can reduce 100-

[1] Milbank, A, "A Geographic Perspective on the Current Biomass Resource Availability in the United States," USDOE NREL, 2005, page 44, www.nrel.gov/docs/fy06osti/39181.pdf, USDOE NREL, 2005, page 40.

year floods by up to 10% alone, and up to 39% if combined with other practices like conservation tillage and upland flood storage.[2]

- **Provides better habitat** for people, fish and wildlife by restoring native prairies, woodlands and promoting more conservation tillage. Creating energy biomass farms can also help restore native grassland habitats. The Nature Conservancy reports that more 90% of North American's original prairies have been lost. The Iowa Prairie Network estimates that only 0.1% of Iowa's prairie remains.[3] Prairies provide good wildlife habitat for pheasants and other upland bird species and declining migratory songbird species.

- **Provide Cleaner Energy--**Better Enviro's 2007 report, *Cellulose Prairie: Biomass Fuel Potential in Wisconsin and the Midwest,* showed that Iowa has enough excess biomass to replace much of its coal use and half of Wisconsin's, significantly reducing the largest source of greenhouse air pollution. See http://betterenvironmentalsolutions.com/reports/CellulosePrairie.pdf for more.

- **Provide Cleaner Water--**Prairie grasses prevent soil erosion and reduce polluted runoff by up to 75%, according to the USDA Natural Resources Conservation Service. Native prairie grasses filter strips act like coffee filters to strain out pollutants and absorb nutrients.[4]

- **Cut Greenhouse Air Pollutants**—A *Science* study showed that early successional lands like prairies can reduce the most carbon compared with tillage and forest management strategies.[5]

To maximize habitat value, grasses should be cut after nesting season to protect nesting birds and chicks. Because different bird species prefer different conditions, both harvested and unharvested fields should be left for wintering habitat.

Biomass can help electric utilities meet clean air standards with cost-effective control equipment, and reduces greenhouse air pollution from a large CO2 source. A dry ton of switchgrass has about has 16 million BTUs per dry pound,[6] 90% as much energy as a ton of coal, but burns much cleaner. We assume a very modest production of 6 tons/acre/year by the range appears to be 1.5-9 T/acre/year depending on soil type. One acre of perennial grass cut once per year can offset about 1.5 tons of coal based on our analysis. Switchgrass has been extensively studies for biomass and energy productions.

Global warming appears to be increasing the amount and intensity of rain and snow events. Since 1990, the number of extreme rain and snow events has increased by one-fifth or 20%, according to U.S. Department of Commerce studies. Restoring perennial grasses can also store 1-2 tons of CO2/acre/year with carbon sequestration in the soil, reducing the risk of extreme climate change.

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[2] Interagency Floodplain Management Review Committee to the Administration Floodplain Management Taskforce, "Sharing the Challenge: Floodplain Management into the 21st Century," Washington, D.C., 1994, p. 157.
[3] www.nature.org/wherewework/northamerica/states/oklahoma/preserves/tallgrass.html and www.iowaprairienetwork.org/prairies/remaining.htm.
[4] USDA NRCS website at www.nrcs.usda.gov/feature/buffers.
[5] Robertson, Paul & Harwood. 2000. *Science* 289:1922-1925.
[6] U.S. Department of Energy, Biomass Feedstock Composition and Property Database, www.eere.energy.gov/biomass/progs/search1.cgi.

Economic Scenarios

Prairies biomass could give Midwest farmers another crop of 3-9 dry tons of grass production with an income source of $150-450 per acre at $50 per dry ton. Another advantage is that grasses use existing hay balers to harvest giving jobs to custom operators and have minimal inputs. This can beat corn production in net profits to farmers if long term biomass contracts are established.

Floodplain Corn Production Scenario

Growing an average of 150 bushels corn/acre/year x $4/BU = $600/acre/year revenue - $600/acre costs = $0/acre/year net profit

We assume a potential yield of 200 BU/acre but 25% of the crop is lost to flooding and no crop insurance.

Biomass Buffer Grasses

Growing 6 tons biomass/acre/year x $50/ton = $300/acre/year - $100/acre costs = $200/acre/year net profit.

We assume 6 tons of Swithgrass and biomass production per year and switchgrass can tolerate wet conditions and still get a harvest.

Potential Partners

FEMA, Iowa and Wisconsin Emergency Management Agency, Wisconsin and Iowa Departments of Natural Resources and Agriculture, Natural Resource Conservation Service, Alliant Energy, Ecel Energy, Prairie Lands Bio-Products, James Lee Witt and Associates, Wisconsin and Iowa Farm Bureau, Wisconsin and Iowa Wildlife Federation, Pheasants Forever, Association of State Floodplain Managers, state floodplain manager, and Better Environmental Solutions.

Next Steps

Work with Iowa and Wisconsin Emergency Management, DNRs and utilities to implement this program on floodplain farms near Marshalltown and other power plants.

Better Environmental Solutions is an award winning environmental consulting business with 15 years of flood protection experience. President Brett Hulsey MNS won FEMA's Distinguished Public Service Award for helping people recover from floods and restoring wetland to reduce flooding. He is author of numerous reports on flooding like "Wetland Restoration in Waiting."

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